IN THE SPECIFICATION

Please replace the paragraph beginning on Page 3, line 4 with:

-- FIG. 1 shows the establishment of the Coanda effect. In (A) air is blown out horizontally from a nozzle 100 with constant speed V. The nozzle 100 is placed adjacent to a curved surface 102. Where the air jet 101 touches the curved surface 102 at point 103, the air between the jet 101 and the surface 102 as it curves away is pulled into the moving airstream both by air friction and the reduced air pressure in the jet stream, which can be derived using Bernoulli's principles. As the air is carried away, the pressure at point 103 drops. There is now a pressure differential across the jet stream so the stream is forced to bend down, as in (B). The contact point [[104]] 103 has moved to the right 104. As air is continuously being pulled away at point 104, the jet continues to be pulled down [[to]] toward the curved surface 102. The process continues as in (C) with the contact point 105 moving farther to the right, until the air jet velocity V is reduced by air and surface friction.

Please replace the paragraph beginning on Page 41, line 6 with:

-- To adapt the aforementioned developments into a form which can be conveniently used, two variations including cannister and upright vacuum cleaners are disclosed and depicted in FIGS. 23 and 24, respectively. The improved centrifugal dust separator comprising impeller 2302, dust container 2318, and motor 2315 is contained in a cannister housing 2317. The housing 2317 is equipped with a handle 2301 in order to move and lift the cannister conveniently. The tubing of the separator leads into hosing [[2315]] 2319. Hose coupling 2303 couples hosing [[2315]] 2319 to the ~~vacuum cleaner~~ cannister housing 2317. This hosing [[2315]] 2319 is flexible to allow the vacuum to be used in a variety of situations. The concentric hosing [[2315]] 2319 [[the]] leads to a second set of tubing comprising inner tube 2306 and outer tube 2305. The hosing 2315 is coupled to inner tube 2306 and outer tube 2305 with hose coupling [[2318]] 2320. The end of the second set of tubing ends in a toroidal vortex nozzle comprising inner donut 2308 and outer fairing 2310. The tubing may be hinged such that the nozzle may be tilted at various angles. The hinge 2309 must be configured such that incoming and outgoing airflow is maintained. The toroidal

vortex nozzle may be adapted for more efficient use. A wheel 2313 may be provided such that the nozzle may smoothly traverse a surface 2316. The wheel 2313 may also be adjustable as to allow the nozzle to be held at varying distances from a surface. For such applications such as cleaning carpets and floors, the nozzle may be equipped with a rotating brush 2312. The rotating brush 2312 is implemented as to guide airflow into a toroidal vortex while simultaneously loosening dirt from the carpet 2314. Alternatively, the rotating brush 2312 may be set forward and the guide means of the nozzle may remain as described in previous embodiments. A motor 2311 may be provided in the nozzle to power the rotating brush 2312.

Please replace the paragraph beginning on Page 38, line 1 with:

-- The horizontal cross-section of FIG. 22B illustrates the circular shape of the housing. The cylindrical walls of the housing maintain the vortex airflow. Attached to the cylindrical housing is the dust collector 2205. The dust collector 2205 is a sealed container in which debris ejected from the vortex accumulate. The housing has an opening in its outer wall through which dust 2206 may pass. As shown in the horizontal cross, the edge of the opening

facing into the direction of airflow bends slightly inwards to facilitate dust collection. The dust collector 2205 is attached to the outer and lower walls of the housing as shown in FIG 22. The walls of the outer tube 2202 bend slightly outward to facilitate smooth airflow from the chamber 2207 to the annular exit duct 2203 between inner tube 2201 and outer tube 2202. Nevertheless, other arrangements to facilitate airflow may just as well be used. The inner tube 2201 and outer tube 2202 may extend downward and terminate with a toroidal vortex nozzle as depicted in FIG. 13. Although this is the preferred embodiment, the centrifugal dust separator is capable of functioning without such a nozzle. Any other concentric nozzle design may be used. In addition, any system that supplies an input flow to inner tube 2201 and receives an output flow from annular duct formed between inner tube 2201 and outer tube 2202 is capable of utilizing the separator.

Please replace the paragraph beginning on Page 39, line 1 with:

-- The flow geometry of the improved centrifugal separator is also depicted in FIGS. 22A and 22B. Dust-laden air is sucked up through the inner tube 2201 under

the power of the impeller 2209. The impeller blades 2208 then move the air in a circular pattern. Circularly rotating air is then directed outwards where it spirals downward along the outer wall of the chamber 2207 creating a cylindrical vortex flow pattern. The kinetic energy of the circulating air creates a higher pressure at the outer boundaries of chamber 2207 than that of the air in the body of the chamber 2207. This higher pressure is maintained in the dust collector 2205. Depending on the system geometry, this pressure may be higher or lower than the outside ambient. This high pressure forces air inward maintaining air's circular path. However, the circulating dust is not inhibited from carrying straight into the dust collector as shown in FIGS. 22A and 22B. When the spiraling air reaches the bottom of the outer wall of the chamber 2207, the air then spirals upward along the inner wall of the chamber 2207. Remaining dust particles may still travel outward from the inner spiral of air. The result is substantially clean air exiting the chamber [2205]] 2207 at the top of its inner wall. The exiting, cleaned air is then sent into the annular duct created between the inner tube 2201 and the outer tube 2202, in which it flows downward. With the addition of straightening vanes 2211, straight flowing air is supplied, preferably, to a toroidal vortex nozzle. Yet,

alternative embodiments are possible not involving a toroidal vortex nozzle or any nozzle.

Please replace the paragraph beginning on Page 40, line 5 with:

-- This embodiment has air 2204 mixed with dirt and dust passing through the impeller 2209. If such an arrangement is considered undesirable or if the impeller 2209 is in the path of large objects sucked in by the nozzle, a course mesh trap may be inserted upstream of the impeller. In alternate arrangements, the impeller 2209 may be replaced with axial air pump or propeller. Such devices may be mounted in the inner tube 2201. The inner tube 2201 may be swelled out for this purpose. Also, the addition of a separate centrifugal separator is contemplated that may be inserted into the air return path and may be driven by the same motor shaft as the impeller 2209.

Please replace the paragraph beginning on Page 4, line 12 with:

-- The simplest coanda nozzle 402 described in the Day publication is shown in FIG. 4. Generally, the nozzle 402 comprises a forward housing 407, rear housing 408 and central divider 403. Air is delivered by a fan to an air

delivery duct 400 and led through the input nozzle 401 to [[an]] output nozzle [[402]] 410. At this point the airflow cross section is reduced so that air flowing through the nozzle 402 does so at high speed. The air may also have a rotational component, as there is no provision for straightening the airflow after it leaves the air pumping fan. The central divider 403 swells out in the terminating region of the output nozzle 402 and has a smoothly curved surface 404 for the air to flow around into the air return duct using the Coanda effect.

Please replace the paragraph beginning on Page 6, line 1 with:

-- When the nozzle is high above the ground, however, there is nothing to turn stray air that proceeded in a straight fashion 501 around into the air return duct and it proceeds out of the nozzle area. Outside air 502, with a low energy level is sucked into the air return to make up the loss. The system is no longer sealed. An example of what happens then is that dust underneath and ahead of the nozzle is blown away. In a bagless system such as this, where fine dust is not completely spun out of the airflow but recirculates around the coanda nozzle, some of this dust will be returned to the surrounding air.

Please replace the paragraph beginning on Page 6, line 18 with:

-- A side and bottom view of an annular ~~Coanda~~ nozzle 600 is shown in FIG. 6. This is a symmetrical version of the nozzle shown in FIG. 4. Generally, the nozzle 600 comprises outer housing 602, air delivery duct 601, air return duct 605, flow spreader 603 and annular ~~Coanda nozzle~~ curved surface 604. Air passes down though the central air delivery duct 601, and is guided out sideways by [[a]] flow spreader 603 to flow over an annular curved surface 604 creating the Coanda effect ~~by the Coanda effect,~~ and is collected through the air return duct 605 by [[a]] the tubular outer housing 602.

Please replace the paragraph beginning on Page 43, line 13 with:

-- FIG. 25B shows hose attachment with an oval shaped toroidal vortex nozzle. A top view [[2503]] 2507, side view [[2502]] 2508, and end view [[2501]] 2506 are also shown in FIG. 25B. As in previous toroidal vortex nozzle, the nozzle is composed of outer tube 2504 and inner donut 2505. A variety of ~~attachment~~ attachments can be provided for the hose. These attachments may be interchangeable so

that the vacuum cleaner may be quickly adapted for different situations.

Please replace the paragraph beginning on Page 27, line 13 with:

-- The toroidal vortex attractor is coaxial and operates in a way that air is blown out of an annular duct and returned into a central duct. FIG. 10 shows a system 1000 comprising outer tube 1001 and inner tube 1002 in which air passes down the inner tube [[1003]] <u>1002</u> and returns up the outer tube 1001. While it would be desirable that the outgoing air returns up into the air return duct 1005; a simple experiment shows that this is not so. Air from the central delivery duct 1004 forms a plume 1007 that continues on for a considerable distance before it disperses. Thus, air is sucked into the air return duct from the surrounding area 1006. This arrangement, without Coanda jet shaping is clearly unsuited to a sealed vacuum cleaner design.

Please replace the paragraph beginning on Page 1, line 1 with:

-- **CROSS REFERENCE TO OTHER APPLICATIONS**

This application is a continuation-in-part of co-pending application entitled "Toroidal Vortex Vacuum Cleaner Centrifugal Dust Separator," U.S. Patent Application Number 10/025,376, filed December 9, 2001, which is a continuation-in-part of co-pending application entitled "Toroidal Vortex Bagless Vacuum Cleaner," U.S. Patent Application Number 09/835,084, filed April 13, 2001, which is a continuation-in-part of co-pending application entitled "Toroidal and Compound Vortex Attractor," U.S. Patent Application Number 09/829,419, filed April 9, 2001, which is a continuation-in-part of co-pending application Ser. No. 09/728,602, now U.S. Patent Number 6,616,094, filed December 1, 2000, entitled "Lifting Platform," which is a continuation-in-part of co-pending Ser. No. 09/316,318, now U.S. Patent Number 6,595,753, filed May 21, 1999, entitled "Vortex Attractor."

Please replace the paragraph beginning on Page 25, line 15 with:

-- FIG. 9 shows a toroidal vortex attractor 900 that has a motor 901 driving a centrifugal pump located within an outer housing 902. The centrifugal pump comprises blades 903 and backplate 904. This pumps air around an inner shroud 905 so that the airflow is a toroidal vortex with a

solid donut core. Flow straightening vanes 906 are inserted after the centrifugal pump and between the inner shroud 905 and the outer casing 902 in order to remove the tangential component of air motion from the airflow. The air moves tangentially around the inner shroud 905 cross section, but radially with respect to the centrifugal pump.

Please replace the paragraph beginning on Page 26, line 19 with:

-- The toroidal vortex vacuum cleaner is a bagless design and one in which airflow must be contained within itself at all times. Air continually circulates from the area being cleaned, through the dust collector and back again. The contained airflow continually circulates from the vacuum cleaner nozzle, to a centrifugal separator, and back to the nozzle. Since dust is not always fully separated, some dust will remain in the airstream heading back towards the nozzle. The air already ~~withing~~ within the system, however, does not leave the system preventing dust from escaping back into the atmosphere. It is not sufficient to design the cleaner to ensure essentially sealed operation while operating adjacent to a surface being cleaned, operation must also remain sealed when away from a surface

to prevent fine dust particles from re-entering the surrounding air.

Please replace the paragraph beginning on Page 34, line 5 with:

-- FIG. 18 illustrates the fluid flow resulting from such venting of outer tube 1802 and inner ~~donut~~ shroud 1801 in the cannister and upright embodiments. Some air from the atmosphere is sucked into the nozzle replacing the air escaping through the vents. Nevertheless, all previously mentioned, desirable characteristics of the toroidal vortex nozzle are preserved.

Please replace the paragraph beginning on Page 35, line 7 with:

-- The toroidal vortex nozzle can avoid this problem in cannister and upright vacuum cleaners. The airflow 2102 in through the nozzle is as shown in FIG. 21A. Airflow 2102 is not restricted from flowing around inner ~~donut~~ shroud [[2103]] 2104 even though the nozzle's outer tube [[2104]] 2103 is pressed against the surface 2105. Further, the air does not need to be accelerated from a stationary state and kinetic energy does not escape the system. Moreover, air is not expelled into the atmosphere preventing the escape

of unseparated dust. This also makes the use of inefficient filters unnecessary.

Please replace the paragraph beginning on Page 18, line 22 with:

-- The efficient features of vortex vacuum cleaners can be used to improve conventional vacuum cleaners. The present invention discusses two common configurations, cannister vacuum and upright vacuum cleaners. A canister-style vacuum may typically provide a vacuum housing removably attached to a vacuum hose for cleaning surfaces other than flooring, whereas an upright vacuum may typically provide for the vacuum opening to be disposed at the bottom of the housing and rolled across the surface to be cleaned. Each style of vacuum cleaner has advantages in certain ~~situation~~ situations. For example, an upright may be optimal for vacuuming large floor areas. However, the cannister configuration may prove convenient for vacuuming furniture and hard-to-reach areas. Nevertheless, conventional vacuum cleaners do not take advantage of the benefits of toroidal vortex technology.

Please replace the paragraph beginning on Page 12, line 17 with:

-- Tuvin et al. also make use of a cyclone separation system. The Tuvin et al. patent includes a cyclone separator that ejects particles outward from a cyclone. However, there are several major differences between [[from]] the present invention and Tuvin et al. First, the means for creating the cyclone flow is not the same. The present invention utilizes an impeller, centrifugal pump, or propeller to create the cylindrical airflow necessary to achieve separation. In contrast, Tuvin et al.'s patent directs the air entering the cyclone chamber tangentially with the chamber's wall. Therefore, in Tuvin et al., the chamber's wall is what then forces the air into cylindrical flow.